Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

First experimental assessment of the Z opacity sample evolution using time-resolved spectroscopy with a gated hybrid CMOS detector.[1]
GUILLAUME LOISEL, JAMES BAILEY, TAISUKE NAGAYAMA, GREGORY DUNHAM, GREGORY ROCHAU, ANTHONY COLOMBO, AARON EDENS, QUINN LOOKER, MARK KIMMEL, JOHN STAHOVIAK, JOHN PORTER, Sandia National Laboratories — The discrepancy between opacity models and laboratory experiments injects uncertainty into stellar interior models. The model/data discrepancy in Fe opacity measurements at high temperature (T >180 eV) and high electron density $3x10^{22}$ cm^{-3} [Bailey et al, *Nature* (2015), Nagayama et al. *PRL* (2019)] have yet to be resolved. Systematic errors from unresolved temporal gradients are one possible hypothesis, despite evidence that such errors are unimportant. Past data recorded on x-ray film provide spectral measurements over a time determined by the backlighter time history, but direct sequential time-resolved measurements didn't exist; until now. The novel hCMOS Ultra-fast X-ray Imager (UXI) camera developed at Sandia National Laboratories and implemented in the opacity spectrometers allows such tests for the first time. Mg K-shell absorption was recorded to measure the opacity sample evolution. These measurements enable further evaluation of possible temporal gradient effects, test simulation predictions, and to optimize future opacity experiment designs.

[1]Sandia National Laboratories is a multimission laboratory managed and operated by NTESS LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. DOEs NNSA under contract DE-NA0003525.

Guillaume Loisel
Sandia National Laboratories

Date submitted: 28 Jun 2019 Electronic form version 1.4